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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/872,796	06/01/2001	Craig L. Stevens	10001.000600 (NVLS 379)	4156
31894	7590	11/08/2004	EXAMINER	
OKAMOTO & BENEDICTO, LLP			KIELIN, ERIK J	
P.O. BOX 641330			ART UNIT	
SAN JOSE, CA 95164			PAPER NUMBER	
			2813	

DATE MAILED: 11/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/872,796	Applicant(s) STEVENS ET AL.	
	Examiner Erik Kielin	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9-13,17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) none is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-13,17 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action responds to the Amendment filed 26 August 2004.

Election/Restrictions

Given the Amendment to the claims filed 26 August 2004, the Restriction is withdrawn.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
2. Claims 1-7, 9-13 and 17, 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,251,759 B1 (**Guo et al.**) in view of US 5,944,857 (**Edwards et al.**).

Regarding independent claims 1 and 17, **Guo** discloses a wafer processing system comprising:

a load lock **114** (Fig. 1);

a transport module having a load chamber **113** (called "buffer chamber" in **Guo**), a transfer chamber **101**, and a pass-through chamber **122** (additionally called "transition chambers" in **Guo** col. 4, line 19) located between the load chamber **113** and the transfer chamber **101**, the load chamber being coupled to the load lock **114**;

an intermediate process module **124** (called "transition chambers" in **Guo** col. 4, line 19) coupled to the load chamber and the transfer chamber (as further limited by instant claim 20);

a loader **130** configured to receive a plurality of wafers to be processed;
a robot **119** configured to transfer a wafer between the load lock **114** and the loader **130**,
the robot **119** being exposed to atmosphere;
a first set of process modules **116, 118, 121** coupled to the load chamber **113**;
a second set of process modules **104, 106, 108, 110** coupled to the transfer chamber;
a second robot **119** configured to transfer a wafer between the load lock **114** and the pass-through chamber **122**, the second robot **119** being under a vacuum during normal operation (as admitted to by Applicant in the section entitled "REMARKS" filed 6 May 2004, at page 5, second paragraph, last sentence); and
a third robot **120** configured to transfer a wafer between the pass-through chamber **122** and the transfer chamber **101**, the third robot **120** necessarily being under a vacuum during normal operation to prevent wafer contamination.

Guo does not teach the load lock having "a pedestal configured to support a single wafer thereon during a pump down of the load lock, the pedestal being an only wafer support located within the load lock, the load lock having an integral cooling unit for cooling the single wafer," or having "a robot configured to transfer a wafer between the load lock and the loader, the robot being under atmospheric pressure during normal operation," as presently amended. (Emphasis added.) Further regarding claim 1 and claim 19, **Guo** does not teach that the pedestal has an integral cooling unit (instant claim 1) that is water-cooled (instant claim 19).

Edwards teaches each of these features including a single-wafer load lock **45** (title) for a multi-chamber semiconductor wafer process module having a **water-cooled, single-wafer** pedestal **48** having only one wafer support for holding only one wafer at a time. The loading

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system is called an “atmospheric pressure front end module” or “AFE” (col. 3, lines 41-46). The AFE includes a first robot **42** working at atmospheric pressure to move the plural wafers at atmospheric pressure (in the loader **25** (called a “carrier” in Edwards) one at a time to the load lock **45** (Fig. 4) at station **37** (Fig. 3) and a second robot **35** operating under vacuum to transfer the wafers from the load lock to a processing-module chamber. (See also Figs. 4, 4A, 4B, and 4C; Abstract; col. 10, lines 3-5).

Edwards teaches many benefits of using a AFE having the single-wafer load lock, as opposed to the multi-wafer load locks used in **Guo**. Among the benefits are (1) increased throughput; (2) reduction in particulate contamination; (3) reduction in size of vacuum pumps; (4) reduction in use of and vibration resulting from use of large vacuum pumps (Edwards, col. 3, lines 8-25).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the AFE having the single-wafer load lock and robot of **Edwards**, as the wafer loading system in **Guo** to enable additional processing (e.g. cooling) and the above-listed benefits, as is taught to be beneficial in **Edwards**.

Regarding claims 2, **Guo** shows process module **118** connected to the load chamber **113** (the first set of process modules) may be a pre-clean module (col. 4, line 7).

Regarding claims 3 and 4, **Guo** shows process module **121** connected to the load chamber **113** (the first set of process modules) may be a physical vapor deposition (PVD) or chemical vapor deposition (CVD) module (col. 4, lines 49-52).

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Regarding claim 6, **Guo** shows process module **104** connected to the transfer chamber 101 (the second set of process modules) is a chemical vapor deposition (CVD) module (col. 4, lines 64-66).

Regarding claims 10, 11, and 21, **Guo** discloses that it is known for the intermediate process module **122** to be configured as either a cooling station or a pre-clean module (col. 1, 45-48; col. 4, line 47).

Regarding claim 12, **Guo** shows the intermediate process module **124** is configured as a PVD chamber.

Regarding claims 5, 7, 9, and 13, **Guo** does not specifically indicate that the second set of process modules (those on the transfer chamber **101**) include a pre-clean module (claim 5) or a PVD module (claim 7), or that the intermediate process module **122**, **124** may be configured as a degas module (claim 9) or a CVD module (claim 13). Note however, that **Guo** teaches the benefits of configuring one of the intermediate chambers **122**, **124** as a PVD module (col. 3, lines 43-50). Additionally, **Guo** teaches that the ordering of process modules is “illustrative” (col. 3, lines 60-63), and that cluster tools include a variety of ordered tools depending upon the process being performed (col. 1, lines 30-48), and also that metallization cluster tools include CVD, PVD, pre-clean and degas modules, among others (col. 2, lines 34-59 and through out the specification and figures). This suggests to one of ordinary skill in the art that the arrangement is a matter of design choice to best suit a given processing steps to be performed in a semiconductor wafer. Moreover, it has been held that mere rearrangement of parts is evidence of obviousness. *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975) (the particular placement of a contact in a conductivity measuring device was held to be an obvious matter of design choice).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to have a pre-clean module or PVD module in the second set of process modules and to have a degas and pre-clean modules as intermediate modules, in order to optimize the process throughput for a given process, as taught by **Guo** and according to precedent. Moreover, Applicant indicates that virtually any arrangement of process modules is possible, thereby teaching away from the criticality of any specific arrangement in the processing system.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-7, 9-13 and 17, 19-21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 2 of U.S. Patent No. 6,431,807 B1 (**Stevens** et al.) in view of US 6,251,759 B1 (**Guo** et al.).

Claims 1 and 2 of the '807 patent claim a single-wafer load lock having only one pedestal configured to support a single wafer thereon, wherein the load-lock has an integral cooling unit to cool the single wafer and a transfer chamber and liquid cooling and the robot for transferring the wafer.

Guo and Edwards teaches a wafer processing system having the remaining features of the claims, as explained above.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to incorporate the cluster system of **Guo** into the single-wafer system of the '807 claims, in order to form the cluster tool having high throughput, as taught by **Guo**.

5. Claims **1-7**, **9-13** and **17**, **19-21** are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over any of claims **1**, **3**, **5**, and **6** of U.S. Patent No. 6,722,835 B1 (**Stevens et al.**) in view of US 6,251,759 B1 (**Guo et al.**).

Each of claims **1**, **3**, **5**, and **6** of the '835 patent claim a single-wafer load lock having only one pedestal configured to support a single wafer thereon, wherein the load-lock has an integral cooling unit to cool the single wafer and a transfer chamber and liquid cooling and the robot operating at atmospheric pressure.

Guo teaches a wafer processing system having the remaining features of the claims, as explained above.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to incorporate the cluster system of **Guo** into the single-wafer system of the '835 claims, in order to form the cluster tool having high throughput, as taught by **Guo**.

Response to Arguments

6. Applicant's arguments with respect to claims **1-7**, **9-13** and **17**, **19-21** have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 571-272-1693. The examiner can normally be reached on 9:00 - 19:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Erik Kielin
Primary Examiner
4 November 2004